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| EXAMINER | |
|---|---|
| STARKS, WILBERT L | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2129 | |

DATE MAILED: 08/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/870,946 | COOPER, DAVID L. | |
| | Examiner | Art Unit | |
| | Wilbert L. Starks, Jr. | 2129 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-90 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-90 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC §101*

1. 35 U.S.C. §101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

the invention as disclosed in claims 1-90 is directed to non-statutory subject matter.

2. Regardless of whether any of the claims are in the technological arts, none of them is limited to practical applications in the technological arts. Examiner finds that *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994) controls the 35 USC §101 issues on that point for reasons made clear by the Federal Circuit in *AT&T Corp. v. Excel Communications, Inc.*, 50 USPQ2d 1447 (Fed. Cir. 1999). Specifically, the Federal Circuit held that the act of:

> ...[T]aking several abstract ideas and manipulating them together adds nothing to the basic equation. *AT&T v. Excel* at 1453 quoting *In re Warmerdam*, 33 F.3d 1354, 1360 (Fed. Cir. 1994).

Examiner finds that Applicant's "data" references are just such abstract ideas.

3. Examiner bases his position upon guidance provided by the Federal Circuit in *In re Warmerdam*, as interpreted by *AT&T v. Excel*. This set of precedents is within the same line of cases as the *Alappat-State Street Bank* decisions and is in complete

agreement with those decisions. *Warmerdam* is consistent with *State Street*'s holding that:

> Today we hold that *the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price*, constitutes a practical application of a mathematical algorithm, formula, or calculation because it produces 'a useful, concrete and tangible result" -- *a final share price momentarily fixed for recording purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.* (emphasis added) *State Street Bank* at 1601.

4. True enough, that case later eliminated the "business method exception" in order to show that business methods were not per se nonstatutory, but the court clearly *did not* go so far as to make business methods *per se statutory*. A plain reading of the excerpt above shows that the Court was *very specific* in its definition of the new *practical application*. It would have been much easier for the court to say that "business methods were per se statutory" than it was to define the practical application in the case as "...the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price..."

5. The court was being very specific.

6. Additionally, the court was also careful to specify that the "useful, concrete and tangible result" it found was "a final share price momentarily fixed for recording purposes and even accepted and relied upon by regulatory authorities and in subsequent trades." (i.e. the trading activity is the further practical use of the real world

monetary data beyond the transformation in the computer – i.e., "post-processing activity".)

7. Applicant cites no such specific results to define a useful, concrete and tangible result. Neither does Applicant specify the associated practical application with the kind of specificity the Federal Circuit used.

8. Furthermore, in the case *In re Warmerdam*, the Federal Circuit held that:

> ...[T]he dispositive issue for assessing compliance with Section 101 in this case is whether the claim is for a process that goes beyond simply manipulating 'abstract ideas' or 'natural phenomena' ... As the Supreme Court has made clear, '[a]n idea of itself is not patentable, ... *taking several abstract ideas and manipulating them together adds nothing to the basic equation*. In re Warmerdam 31 USPQ2d at 1759 (emphasis added).

9. Since the Federal Circuit held in *Warmerdam* that this is the "dispositive issue" when it judged the usefulness, concreteness, and tangibility of the claim limitations in that case, Examiner in the present case views this holding as the dispositive issue for determining whether a claim is "useful, concrete, and tangible" in similar cases. Accordingly, the Examiner finds that Applicant manipulated a set of abstract "data" to solve purely algorithmic problems in the abstract (i.e., what *kind* of "data" are used? Generally, neural network nodes are implemented purely in software as nonlinear regression algorithms. It is possible to have hardware artificial neural nodes, but Applicant makes no such limitation in the claims) Clearly, a claim for manipulation of "data" is provably even more abstract (and thereby less limited in practical application) than pure "mathematical algorithms" (since they can be applied to solve mathematical algorithms...and more) which the Supreme Court has held are per se nonstatutory – in fact, it *includes* the expression of nonstatutory mathematical nodal and layer algorithms.

10. Since the claims are not limited to exclude such abstractions, the broadest reasonable interpretation of the claim limitations includes such abstractions. Therefore, the claims are impermissibly abstract under 35 U.S.C. §101 doctrine.

11. Since *Warmerdam* is within the *Alappat-State Street Bank* line of cases, it takes the same view of "useful, concrete, and tangible" the Federal Circuit applied in *State Street Bank*. Therefore, under *State Street Bank*, this could not be a "useful, concrete and tangible result". There is only manipulation of abstract ideas.

12. The Federal Circuit validated the use of *Warmerdam* in its more recent *AT&T Corp. v. Excel Communications, Inc.* decision. The Court reminded us that:

> Finally, **the decision in In re Warmerdam**, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994) **is not to the contrary**. *** The court found that the claimed process did nothing more than manipulate basic mathematical constructs and concluded that **'taking several abstract ideas and manipulating them together adds nothing to the basic equation'**; hence, the court held that the claims were properly rejected under §101 ... Whether one agrees with the court's conclusion on the facts, the **holding** of the case is a straightforward application of the basic principle that mere laws of nature, natural phenomena, and abstract ideas are not within the categories of inventions or discoveries that may be patented under §101. (emphasis added) AT&T Corp. v. Excel Communications, Inc., 50 USPQ2d 1447, 1453 (Fed. Cir. 1999).

13. Remember that in *In re Warmerdam*, the Court said that this was the dispositive issue to be considered. In the *AT&T* decision cited above, the Court reaffirms that this is the issue for assessing the "useful, concrete, and tangible" nature of a set of claims under §101 doctrine. Accordingly, Examiner views the *Warmerdam* holding as the dispositive issue in this analogous case.

14. The fact that the invention is merely the manipulation of *abstract ideas* is clear. Applicant's "data" references are simply abstract constructs that do not limit the claims to the transformation of real world data (such as monetary data or heart rhythm data) by

some disclosed process. Consequently, the necessary conclusion under *AT&T, State Street* and *Warmerdam,* is straightforward and clear. The claims take several abstract ideas (i.e., "data" in the abstract) and manipulate them together adding nothing to the basic equation. Claims 1-90 are, thereby, rejected under 35 U.S.C. §101.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. §112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-90 are rejected under 35 U.S.C. §112, first paragraph because current case law (and accordingly, the MPEP) require such a rejection if a §101 rejection is given because when Applicant has not in fact disclosed the practical application for the invention, as a matter of law there is no way Applicant could have disclosed *how* to practice the *undisclosed* practical application. This is how the MPEP puts it:

> ("The how to use prong of section 112 **incorporates as a matter of law** the requirement of 35 U.S.C. §101 that the specification disclose as a matter of fact a practical utility for the invention.... If the application fails as a matter of fact to satisfy 35 U.S.C. § 101, then the application **also fails as a matter of law** to enable one of ordinary skill in the art to use the invention under 35 U.S.C. § 112."); In re Kirk, 376 F.2d 936, 942, 153 USPQ 48, 53 (CCPA 1967) ("Necessarily, compliance with § 112 requires a description of how to use presently useful inventions, **otherwise an applicant would anomalously be required to teach how to use a useless invention.**") See, MPEP 2107.01(IV), quoting In re Kirk (emphasis added).

Therefore, claims 1-90 are rejected on this basis.

## *Claim Rejections - 35 USC § 102*

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1-5 and 27-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Lo (U.S. Patent Number 5,408,424; dated 18 April 1995; class 708; subclass 303). Specifically:

### Claim 1

Claim 1's "using a **plurality of layers**, each layer including a plurality of computational nodes for **implicit communication**, an input processing layer, a central processing layer, and an output processing layer;" is anticipated by Lo, Fig 6 in its entirety. Further, the "implicit communication" is anticipated by Lo, col. 5, lines. 1-17 where it recites:

> If a mathematical model of the signal and measurement processes such as (1) and (2) is available, the realizations of the signal and measurement processes are generated by computer simulation. Otherwise, these training data can be collected by conducting actual experiments with the signal and measurement processes. Since we **do not use a mathematical model to derive formulas and equations, such properties as the Markov property**, Gaussian distribution and additive noise are not required of the signal and measurement processes for the present invention to apply. In fact, the present invention applies to virtually **any signal process** (to be defined in the sequel) and measurement process with **only one restriction**: the values of the measurement process must lie in a compact (i.e. bounded and closed) region. This restriction is certainly not too restrictive in the real world.

In other words, the prior art can be applied to "implicit" (i.e., unsupervised) learning processes too.

Claim 1's "using at least one **feedforward** channel for inputs;" is anticipated by Lo, Fig 6 in its interlink nodes.

Claim 1's "using **full lateral and feedback** connections within the processing layers;" is anticipated by Lo, Fig 4.

Claim 1's "using an **output channel** for outputs;" is anticipated by Lo, Fig 6, element 28.

Claim 1's "using **re-entrant feedback** from the output channel to at least one of the processing layers;" is anticipated by Lo, Fig 6, element 26.

Claim 1's "using local **update** processes to update each of the plurality of computational nodes; and" is anticipated by Lo, col. 2, lines 13-18, where it recites:

> Then the EKF uses the KF equations to **update** the estimated value of x(t+1) and the predicted value of x(t+2) for the new measurement y(t+1). By iterating the linearization and estimation a certain number of times or until convergence at each time point, we have the so-called iterated EKF (IEKF).

Claim 1's "using re-entrant feedback from the output channel to perform minimalization for general computation." is anticipated by Lo, Fig 6, element 26.

Claim 1's "outputting processed data" is anticipated by Lo, Fig. 3 where there are output terminals.

**Claim 2**

Claim 2's "The method of claim 1, wherein the output channel uses **feedforward** connections between the output channel and at least one of the processing layers." is anticipated by Lo, Fig 6, element 28.

**Claim 3**

Claim 3's "The method of claim 1, wherein the output channel uses **bi-directional** connections between the output channel and at least one of the processing layers." is anticipated by Lo, col. 3, lines 31-39, where it recites:

> There is a large number of ANN paradigms such as Hopfield networks, high-order networks, counter-propagation networks, **bidirectional** associative memories, piecewise linear machines, neocognitrons, self-organizing feature maps, adaptive resonance theory networks, Boltzmann machines, multilayer perceptrons (MLPs), MLPs with various feedback structures, other recurrent neural network paradigms, etc. (Emphasis added.)

**Claim 4**

Claim 4's "The method of claim 1, wherein the re-entrant feedback is **uni-directional**." is anticipated by Lo, Fig. 6, element 26.

**Claim 5**

Claim 5's "The method of claim 1, wherein the re-entrant feedback is **bi-directional**." is anticipated by Lo, col. 3, lines 31-39, where it recites:

> There is a large number of ANN paradigms such as Hopfield networks, high-order networks, counter-propagation networks, **bidirectional** associative memories, piecewise linear machines, neocognitrons, self-organizing feature maps, adaptive resonance theory networks, Boltzmann machines, multilayer perceptrons (MLPs), MLPs with various feedback structures, other recurrent neural network paradigms, etc. (Emphasis added.)

**Claim 27**

Claim 27's "neural network architecture means having a **plurality of layer means**, each layer means including a plurality of adaptive computational node means, the plurality of layer means" is anticipated by Lo, Fig. 4, elements 15-19.

Claim 27's "**input** processing layer means, **central** processing layer means, and **output** processing layer means;" is anticipated by Lo, Fig. 4, elements 15-19.

Claim 27's "for implicit computation" is anticipated by Lo, Fig 6 in its entirety. Further, the "implicit communication" is anticipated by Lo, col. 5, lines. 1-17 where it recites:

> If a mathematical model of the signal and measurement processes such as (1) and (2) is available, the realizations of the signal and measurement processes are generated by computer simulation. Otherwise, these training data can be collected by conducting actual experiments with the signal and measurement processes. Since we **do not use a mathematical model to derive formulas and equations, such properties as the Markov property**, Gaussian distribution and

> additive noise are not required of the signal and measurement processes for the present invention to apply. In fact, the present invention applies to virtually **any signal process** (to be defined in the sequel) and measurement process with **only one restriction**: the values of the measurement process must lie in a compact (i.e. bounded and closed) region. This restriction is certainly not too restrictive in the real world.

In other words, the prior art can be applied to "implicit" (i.e., unsupervised) learning processes too.

Claim 27's "**feedforward** input channel means;" is anticipated by Lo, Fig. 4, elements 16 and 17.

Claim 27's "**full lateral and feedback** connection means within the processing layer means;" is anticipated by Lo, Fig. 4, elements 18.

Claim 27's "**output channel** means;" is anticipated by Lo, Fig. 4, elements 17.

Claim 27's "**re-entrant** feedback means from the output channel means to the processing layer means;" is anticipated by Lo, Fig. 6, element 26.

Claim 27's "means for updating each of the plurality of adaptive computational node means using local **update** processes; and" is anticipated by Lo, col. 2, lines 13-18, where it recites:

> Then the EKF uses the KF equations to **update** the estimated value of x(t+1) and the predicted value of x(t+2) for the new measurement y(t+1). By

> iterating the linearization and estimation a certain number of times or until convergence at each time point, we have the so-called iterated EKF (IEKF).

Claim 27's "means for using re-entrant feedback from the output channel means to perform minimalization for general computation." is anticipated by Lo, Fig 6, element 26.

**Claim 28**

Claim 28's "The apparatus of claim 27, wherein the output channel means uses **feedforward** connection means between the output channel means and the processing layer means." is anticipated by Lo, Fig 6, element 28.

**Claim 29**

Claim 29's "The apparatus of claim 27, wherein the output channel means uses **bi-directional** connection means between the output channel means and the processing layer means." is anticipated by Lo, col. 3, lines 31-39, where it recites:

> There is a large number of ANN paradigms such as Hopfield networks, high-order networks, counter-propagation networks, **bidirectional** associative memories, piecewise linear machines, neocognitrons, self-organizing feature maps, adaptive resonance theory networks, Boltzmann machines, multilayer perceptrons (MLPs), MLPs with various feedback structures, other recurrent neural network paradigms, etc. (Emphasis added.)

**Claim 30**

Claim 30's "The apparatus of claim 27, wherein the re-entrant feedback means is **uni-directional**." is anticipated by Lo, Fig 6, element 26.

**Claim 31**

Claim 31's "The apparatus of claim 27, wherein the re-entrant feedback means is **bi-directional**." is anticipated by Lo, col. 3, lines 31-39, where it recites:

> There is a large number of ANN paradigms such as Hopfield networks, high-order networks, counter-propagation networks, **bidirectional** associative memories, piecewise linear machines, neocognitrons, self-organizing feature maps, adaptive resonance theory networks, Boltzmann machines, multilayer perceptrons (MLPs), MLPs with various feedback structures, other recurrent neural network paradigms, etc. (Emphasis added.)

***Response to Arguments***

Applicant's arguments filed 03/30/2005 have been fully considered but they are not persuasive. Specifically:

**Argument 1**

Applicant argues that Claims 27-50 and 70-90 are apparatus claims, and recite a neural network architecture.

These limitations do not limit the claims to statutory matter. First, a mere claim for a "neural network architecture" does not limit a specific hardware architecture, since most neural networks are realized as software "architectures."

Further, the mere recital of the word "apparatus" does not make a claim statutory. If that were true, it would be an obvious, easy to apply, bright line rule that

"apparatus" claims are statutory under any and every condition. There is no such per se rule in §101 doctrine. If that were true, the Patent Office's job would be much easier and the Courts' jobs much more difficult. Here is what the Federal Circuit has actually said about the issue:

> "Whether stated implicitly or explicitly, we consider the scope of Section 101 to be the same regardless of the form -- machine or process -- in which a particular claim is drafted. AT&T v. Excel, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999) citing In re Alappat, 33 F.3d at 1581, 31 USPQ2d at 1589 (Rader, J., concurring) (emphasis added.)"

Further, the Court held that:

> "Furthermore, the Supreme Court's decisions in Diehr, Benson, and Flook, all of which involved method (i.e., process) claims, have provided and supported the principles which we apply to both machine- and process-type claims. Thus, we are comfortable in applying our reasoning in Alappat and State Street to the method claims at issue in this case." AT&T v. Excel, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999)

The Federal Circuit was quite clear as to the fact that the scope of §101 is the same regardless of the form -- machine or process -- in which the claim is drafted.

The Courts do not focus on the type of "patentable subject matter" (i.e., apparatus, method, product of manufacture, or composition of matter) in the preamble of the claim. The courts focus on the factors held in Diamond v. Diehr, Alappat, Warmerdam, State Street Bank, and Excel. The Courts had numerous opportunities to create a per se rule, but declined for various good reasons to do so. Applicant makes an argument that is directly opposed to Federal Circuit precedent. Examiner feels no

motivation to follow Applicant on this course. Applicant's argument is unpersuasive to Examiner and the rejections STAND.

**Argument 2**

Applicant argues that independent claims 27 and 70 recite a data processing apparatus. As presented in response to Argument 1, the mere recital of the word "apparatus" does not make a claim statutory.

**Argument 3**

Applicant argues that claim 1 is amended to recite that data are processed by a neural network. A mere claim for a "neural network architecture" does not limit a specific hardware architecture, since most neural networks are realized as software "architectures."

**Argument 4**

Applicant argues that claim 51 is amended to recite a minimalization step. A particular calculation step does not make a claim statutory. There is no law to say that a certain type of mathematics is per se statutory.

**Argument 5**

Applicant argues that claim 1 is amended to output processed data. Mere data output, without a "useful, concrete and tangible result" is not statutory.

## Argument 6

Applicant argues that the claims are drawn to apparati and methods for implicit digital computation. The mere recital of "digital computation" does not bring statutory mater to the claims. There must be a "useful, concrete and tangible result."

## Argument 7

Applicant asserts that the recital of "implicit" computation in the claims brings a patentable distinction over the prior art of Lo.

Examiner disagrees.

Applicant's "implicit" computation is merely a claim for unsupervised learning. Page 12 of Applicant's Specification recites the following:

> The invention permits rapid, **unsupervised processing** of complex data sets such as imagery, databases, textual files, or continuous human speech.

This "implicit communication" is anticipated by Lo, col. 5, lines. 1-17 where it recites:

> If a mathematical model of the signal and measurement processes such as (1) and (2) is available, the realizations of the signal and measurement processes are generated by computer simulation. Otherwise, these training data can be collected by conducting actual experiments with the signal and measurement processes. Since we **do not use a mathematical model to derive formulas and equations, such properties as the Markov property**, Gaussian distribution and additive noise are not required of the signal and measurement processes for the present invention to apply. In fact, the present invention applies to virtually **any signal process** (to be defined in the sequel) and measurement process with **only one restriction**: the values of the

measurement process must lie in a compact (i.e. bounded and closed) region. This restriction is certainly not too restrictive in the real world.

In other words, the prior art can be applied to "implicit" (i.e., unsupervised) learning processes too.

**Argument 8**

Applicant argues that "local" updates are distinguishable from the prior art of Lo. Applicant has not defined the word "local". Therefore, in the broadest reasonable interpretation of the prior art, the "update" of Lo anticipates Applicant's "local update."

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Wilbert L. Starks, Jr. whose telephone number is (571) 272-3691.

Alternatively, inquiries may be directed to the following:

| | |
|---|---|
| **S. P. E. David Vincent** | **(571) 272-3080** |
| **Official (FAX)** | **(571) 273-8300** |

WLS

19 August 2006